## Med4 Aalborg

## Exercises 4 (23 February 2009)

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## Use case for a supermarket till system

Read the following text which is a first draft of a description of the use case "Purchase items in supermarket" for a supermarket till system. Then discuss the questions that follow the use case description.

Purchase items in supermarket A customer arrives at the till with items that he or she wants to purchase. The items are placed on the conveyor belt. The cashier picks up each item and uses a scanner to scan the bar code on the item. The scanner then stores the bar code in the system.

Fruit and vegetables are not bar-coded. If an item is a bag containing fruit or vegetables, the cashier must identify what kind of fruit or vegetable it is, select it from a list of available fruit and vegetables displayed on a screen and then weigh the bag using a special weighing scales that directly sends the weight to the till system which automatically calculates the price for the bag.
For each set of similar items, the cashier may either manually enter the number of items after scanning one of them or scan each of the items separately. Some of the items have a "buy-one-get-one-free" offer, whereby two such items cost the same as one, three or four of them cost the same as two, five of them cost the same as three and so on.

Once all the items have been scanned or entered into the system, the total amount to be paid by the customer is calculated and displayed to the cashier and the customer. The customer may pay by cheque, with a credit or debit card or with cash.

If the customer wants to pay with a cheque, the cashier must write the number from the customer's cheque guarantee card on the back of the cheque, put the cheque in the till and inform the system that the customer has paid. The system then prints a receipt which is given to the customer.
If the customer pays with a credit card or debit card, the cashier swipes the card, the system sends a request to the card issuer system for the total amount to be paid to be deducted from the card account. The card issuer system then automatically sends back either a request for the customer to enter a PIN in order to confirm the transaction or a message informing the till system that the card has been refused. If the card issuer system sends a request for the customer to enter a PIN, the total amount to be paid will be displayed to the customer who will be required to enter his or her PIN and press the ENTER button to confirm the payment. If the payment is confirmed in this way, the card issuer system sends a notification to the till system that the payment has been made into the store's bank account. In this case, the system records that the purchase is complete and prints out a receipt which is given to the customer. If the card issuer system refuses the card, then the customer is given the opportunity to use some other method of payment. If no other method of payment is possible, the cashier cancels the transaction.

## Questions

Now discuss the following questions.

1. Each actor in a use case analysis is either a user of the system in a particular role or something external to the system that interacts with the system. For example, an actor might be another information system or a hardware device like a scanner. Identify who or what the actors are in the "Purchase items in supermarket" use case.
2. Use the "noun identification technique" to identify a list of candidate classes for the supermarket till system.
3. Obtain an initial class list for the supermarket till system by removing from your list those candidate classes that should not be represented in the system. Briefly explain why each candidate class that you remove should not be in the system.
4. Draw a class diagram that shows how the classes in your initial class list are associated with each other. Label each association and add multiplicities where appropriate.
5. Can the class diagram that you have just drawn be simplified by allowing some of your classes to inherit from other classes? If so, will you need to define new classes that are superclasses of the classes in your initial class list? Draw a new class diagram that includes representations of the generalization relationships that exist between the classes in your new design.
6. Suppose that you are about to start the first iteration of a spiral development process to develop a supermarket till system. You need to specify the functionality that you will provide in the system that your team will deliver at the end of the first iteration. Will you attempt to provide all the functionality required by the "Purchase items in supermarket" use case at the end of the first iteration? If not, what subset of this functionality will you aim to deliver at the end of the first iteration?
7. Sketch a use case diagram for the system that you will aim to deliver at the end of the first iteration.
8. Sketch a class diagram for the system that you will aim to deliver at the end of the first iteration.
9. Do you think the "Purchase items in supermarket" use case description could be improved? Have any important steps been left out? Does it contain irrelevant details? Does it contain errors?


## Noun identification technique

1. Take a clear concise statement of requirements or use case descriptions
2. Underline all nouns and noun phrases
3. This gives us candidate classes
4. Remove inappropriate classes to get initial class list for the system

